

CLAIMS:

1. An electroluminescent red emitting phosphor compound having a formulation $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$ where x is in the range from about 0.01 to about 0.4 and y is greater than zero and spans the range in which it is soluble in $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$.
2. A red emitting phosphor compound according to claim 1 wherein y is in the range from about 0.05 to about 0.3.
3. A red emitting phosphor compound according to claim 1 wherein y is 0.17.
4. A red emitting phosphor compound according to claim 1 wherein said phosphor is sputtered from a source selected from the group consisting of Ga_2O_3 , Eu_2O_3 , and In_2O_3 .
5. An electroluminescent display device 20 having:
 - a) a dielectric layer (30) having a front surface, a back surface and a conducting electrode (32) on the back surface thereof;
 - b) an electroluminescent red emitting phosphor film (28) having a formulation $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$, where x is in the range 0.01 to 0.4, y is greater than zero and spans the range in which it is soluble in $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$, said phosphor film being disposed on the front surface of said dielectric layer (30); and
 - c) a substantially transparent electrode (24) disposed on an outer surface of said phosphor film.
6. An electroluminescent display device (20) according to claim 5 wherein said formulation of said phosphor film comprises y in the range from about 0.05 to about 0.3.

7. An electroluminescent display device (20) according to claim 5 wherein said formulation of said phosphor film comprises y equal to 0.17.
8. An electroluminescent display device (20) according to claim 5 wherein said phosphor film (28) is deposited from a source material by sputtering.
9. An electroluminescent display device (20) according to claim 8 wherein said source material has a formulation selected from the group consisting of Ga_2O_3 , Eu_2O_3 , and In_2O_3 .
10. An electroluminescent display device (20) according to claim 8 wherein said phosphor film (28) is sputtered at a substrate heated to a temperature of 450°C - 540°C .
11. An electroluminescent display device according to claim 8 wherein said phosphor film (28) is annealed at about 600°C or less for about 1 hour in air.
12. An electroluminescent display device (20) having
a phosphor layer (28) made from the compound $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$ in which x is in the range from 0.01 to 0.4 and y is greater than zero and spans the range in which it is soluble in $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$,
at least one dielectric insulating layer (30, 26) disposed adjacent said phosphor layer (28) and
first and second electrodes (24, 32) disposed on opposite sides of said phosphor layer (28) with said at least one dielectric insulating layer (30, 26) disposed therebetween, at least one said electrode (24) being substantially transparent.

13. An electroluminescent display device (20) according to claim 12 in which one said first and second electrodes (24) is formed on a substantially transparent substrate (22).

14. An electroluminescent display device (20) according to claim 12 having two dielectric insulating layers (26, 30) formed on opposite sides of said phosphor layer (28).

15. An electroluminescent display device (20) according to claim 12 having means for applying a voltage between said first and second electrodes (24, 32).

16. An electroluminescent display device (20) according to claim 12 in which at least one said first and second electrodes (24, 30) is made from material selected from the group comprising indium-tin oxide and aluminum doped zinc oxide.

17. An electroluminescent display device (20) according to claim 12 in which said at least one dielectric insulating layer (26, 30) is substantially transparent.

18. An electroluminescent display device (20) according to claim 12 in which said at least one dielectric insulating layer (26, 30) is strontium titanate.

19. An electroluminescent display device (20) according to claim 12 in which said at least one dielectric insulating layer (26, 30) is selected from the group comprising SiO_2 , SiON , Al_2O_3 , BaTiO_3 , BaTa_2O_6 , SrTiO_3 , PbTiO_3 , PbNb_2O_6 , Sm_2O_3 , $\text{Ta}_2\text{O}_5\text{-TiO}_2$, Y_2O_3 , Si_3N_4 , SiAlON .

20. An electroluminescent display device (20) according to claim 13 in which said substantially transparent substrate (22) is selected from the group comprising: glass,

silicon and quartz.

21. An electroluminescent display device (20) according to claim 12 in which said at least one dielectric insulating layer (26, 30) is selected from the group comprising BaTiO_3 , SrTiO_3 , PbZrO_3 , PbTiO_3 .
22. An electroluminescent display device (20) according to claim 12 in which one said first and second electrodes (24, 32) is formed on a substrate (22).
23. An electroluminescent display device according to claim 22 in which said substrate (22) is selected from the groups comprising: Al_2O_3 , BaTiO_3 , SrTiO_3 , PbZrO_3 , PbTiO_3 .
24. A method of producing electroluminescence comprising providing an electroluminescent phosphor (28) made from the compound $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$ in which x is in the range from 0.01 to 0.4 and y is greater than zero and spans the range in which it is soluble in $\text{Ga}_{2-x-y}\text{In}_x\text{Eu}_y\text{O}_3$ and applying an effective voltage across said electroluminescent phosphor to develop an electric field.
25. A method of producing electroluminescence according to Claim 24 in which y is in the range from 0.05 to 0.3.
26. A method of producing electroluminescence according to Claim 24 in which y is equal to 0.17.